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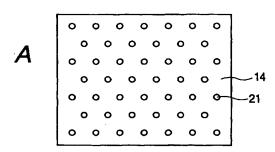
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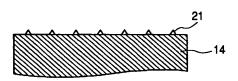
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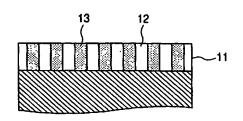
[Continued on next page]

(54) Title: NANOSTRUCTURE, ELECTRONIC DEVICE AND METHOD OF MANUFACTURING THE SAME



(57) Abstract: Cylinders having Al as a major constituent are orderly arrayed in an (Si, Ge) matrix. In a nanostructure in the form of a mixture film having a plurality of cylinders having Al as a major constituent, and a matrix region surrounding the plurality of cylinders and having Si and/or Ge as a major constituent, the total amount of Si and Ge is contained in a proportion in the range from 20 to 70 atomic % in the mixture film, the cylinders are orderly arrayed, the diameter of the cylinders is in the range from 1 to 30 nm, and the interval between the cylinders is 30 nm or smaller.





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#### INTERNATIONAL SEARCH REPORT

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PC 7 B82B1/00 B82B A CLASS B82B3/00 According to International Patent Classification (IPC) or to both national classification and IPC B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) IPC 7 B82B H01L Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal, INSPEC C. DOCUMENTS CONSIDERED TO BE RELEVANT Category ° Citation of document, with indication, where appropriate, of the relevant passages Relevant to claim No. US 6 231 744 B1 (YING JACKIE Y ET AL) 23,24 X 15 May 2001 (2001-05-15) 1-6.10, Υ column 8, line 29 - column 9, line 37; 11 figure 1 PAULOSE MAGGIE ET AL: "Self-assembled 23,24 X fabrication of aluminum– silicon nanowire networks" APPLIED PHYSICS LETTERS, AMERICAN INSTITUTE OF PHYSICS. NEW YORK, US vol. 81, no. 1, 1 July 2002 (2002-07-01), pages 153-155, XP012031764 ISSN: 0003-6951 Υ 1-6,10,the whole document -/--ΙX Further documents are listed in the continuation of box C. Patent family members are listed in annex. \* Special categories of cited documents : T later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the "A" document defining the general state of the art which is not considered to be of particular relevance invention "E" earlier document but published on or after the International "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such docu-"O" document referring to an oral disclosure, use, exhibition or ments, such combination being obvious to a person skilled in the art. "P" document published prior to the international filing date but later than the priority date claimed "&" document member of the same patent family Date of the actual completion of the international search Date of mailing of the international search report 10 March 2005 18/03/2005 Name and mailing address of the ISA Authorized officer European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31–70) 340–2040, Tx. 31 651 epo nl, Fax: (+31–70) 340–3016 Dauw, X

#### INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP 03/15948

		PCT/JP 03/15948							
C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT  Colones 1. Citation of decument with Indication where consensates of the coloured passages.									
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Retevant to claim No.							
X	EP 0 951 047 A (CANON KABUSHIKI KAISHA) 20 October 1999 (1999-10-20) figures 1,12-19	23,24							
A	WO 02/11216 A (INFINEON TECHNOLOGIES AG; KRETZ, JOHANNES; LUYKEN, RICHARD, JOHANNES;) 7 February 2002 (2002-02-07) pages 8-10; figures 1A,B,C	1-24							
A	US 2002/130311 A1 (LIEBER CHARLES M ET AL) 19 September 2002 (2002-09-19) figures 3,4,6,12,19	1-24							
A	US 2002/175408 A1 (MAJUMDAR ARUN ET AL) 28 November 2002 (2002-11-28) figures 12,24,25,31	1-24							
A	US 2002/114949 A1 (BOWER CHRISTOPHER A ET AL) 22 August 2002 (2002-08-22) figures 2a-2e	1-24							
A	US 6 401 526 B1 (DAI HONGJIE ET AL) 11 June 2002 (2002-06-11) figures 2a-2d	1-24							
A	HULTEEN J C ET AL: "A GENERAL TEMPLATE-BASED METHOD FOR THE PREPARATION OF NANOMATERIALS" JOURNAL OF MATERIALS CHEMISTRY, THE ROYAL SOCIETY OF CHEMISTRY, CAMBRIDGE, GB, vol. 7, no. 7, July 1997 (1997-07), pages 1075-1087, XP000703793 ISSN: 0959-9428 figures 8,9,11,12	1-24							

#### INTERNATIONAL SEARCH REPORT

International Application No
PCT/JP 03/15948

					_	
	tent document in search report		Publication date		Patent family member(s)	Publication date
115	6231744	B1	15-05-2001	US	6359288 B1	19-03-2002
-	VEU 1 1 7 7			WO	9848456 A1	29-10-1998
 ЕР	0951047	Α	20-10-1999	JP	2000031462 A	28-01-2000
				EΡ	1378486 A1	07-01-2004
				EP	1378487 A1	07-01-2004
				EΡ	0951047 A2	20-10-1999
				US	6278231 B1	21-08-2001
				US	2001028872 A1	11-10-2001
WO	0211216	Α	07-02-2002	DE	10036897 C1	03-01-2002
				WO	0211216 A1	07-02-2002
				EP	1305834 A1	02-05-2003
				US	2003132461 A1	17-07-2003
us	2002130311	A1	19-09-2002	CA	2447728 A1	16-01-2003
				EP	1436841 A1	14-07-2004
				JP	2004535066 T	18-11-2004
				WO	03005450 A2	16-01-2003
				US	2003089899 A1	15-05-2003
				AU	8664901 A	04-03-2002
				CA	2417992 A1	28-02-2002
				EP	1314189 A2	28-05-2003
				JP	2004507104 T	04-03-2004
				WO	0217362 A2	28-02-2002
				AU	2904602 A	24-06-2002
				CA	2430888 A1	20-06-2002
				EP	1342075 A2	10-09-2003
				JP	2004515782 T	27-05-2004
				WO	0248701 A2	20-06-2002
				US	2002117659 A1	29-08-2002 
US	2002175408	A1	28-11-2002	CA	2442985 A1	10-10-2002
				EP	1374309 A1	02-01-2004
				JP	2004532133 T	21-10-2004
				TW	554388 B	21-09-2003
				WO	02080280 A1	10-10-2002
				US 	2002172820 A1	21-11-2002 
US	2002114949	A1	22-08-2002	AU	2308501 A	30-08-2001
				CA	2331278 A1	25-08-2001
				EP	1129990 A1	05-09-2001
				JP 	2001262343 A	26-09-2001 
110	6401526	<b>B</b> 1	11-06-2002	US	2002178846 A1	05-12-2002